

S/N 09/887,412

Response to Office Action Dated 11/17/2004

AMENDMENTS TO THE CLAIMS

In accordance with the PTO's amendment format, a detailed listing of all claims has been provided. A status identifier is provided for each claim in parentheses following each claim number. Changes to the claims are shown by strikethrough or double bracketing (for deleted text) or underlining (for added text).

In the Claims:

Claims 1-30 were previously pending.

Please amend claims 1, 8, 15, and 26 as shown below.

No claims are canceled.

No new claims are added.

Claims 1-30 are pending.

S/N 09/887,412

Response to Office Action Dated 11/17/2004

Claims

1. (Currently amended) A method comprising:
generating a mesh grid representation of uncovered surfaces of an object,
the mesh grid including at least one grid element;
simulating hair by associating at least one seed with each grid element;
[[and]]
generating the hair in real time, wherein at least one hair extends from each
seed, at least a portion of the hair extending beyond a plurality of boundaries of
the grid element; and
smoothly transitioning in real time from close-up views to distant views of
the hair by utilizing different surface detail modeling techniques associated with
different sets of viewing parameters.
2. (Previously presented) A method according to claim 1, further
comprising:
parameterizing a texture in each of the grids.
3. (Previously presented) A method according to claim 2, wherein
parameterizing the texture comprises:
identifying one or more interactive control and/or viewing parameters
associated with each grid element of the mesh grid to determine, at least in part,
which grid elements of the surface detail model are used to render surface detail in
that grid element.

Response to Office Action Dated 11/17/2004

4. (Previously presented) A method according to claim 3, further comprising:

generating a shell texture model for each grid element of the mesh based, at least in part, on the parameterization of the grid elements.

5. (Previously presented) A method according to claim 1, wherein developing a surface detail model comprises:

generating a shell texture model for each element of a dynamically generated grid element representation of uncovered surfaces of an object.

6. (Previously presented) A method according to claim 5, wherein generating a texture model comprises:

simulating at least one hair in each of the grid elements; and

generating the at least one hair into a volume texture on a per-grid element basis.

7. (Previously presented) A method according to claim 6, further comprising:

utilizing the volume texture to generate semi-transparent concentric shells of the volume texture, which are layered over select areas of the object surface.

8. (Currently amended) A storage medium comprising a plurality of executable instructions which, when executed,

S/N 09/887,412

Response to Office Action Dated 11/17/2004

implement a modeling agent to develop a surface detail model that includes a mesh grid representation made from at least one mesh grid element, the surface detail model utilizing a modeling technique that associates at least one seed with the mesh grid element,

the at least one seed being located in each mesh grid element, at least one surface detail extending from each seed so that at least a portion of the surface detail extends in a direction that has a perpendicular component to a plane formed by the mesh grid element, and

wherein the modeling technique is capable of rendering the surface detail in real time in accordance with the developed surface detail model over an object surface, including smoothly transitioning in real time from close-up views to distant views of the surface detail by utilizing different surface detail modeling techniques associated with different sets of viewing parameters.

9. (Previously presented) A storage medium according to claim 8, wherein the modeling agent generates a mesh grid representation of uncovered surfaces of the object, simulates hair in each of the grid elements, and generates the hair into a volume texture on a per-grid element basis to develop the surface detail model, wherein at least a portion of the hair extends beyond the boundaries of the mesh grid element.

10. (Previously presented) A storage medium according to claim 9, wherein the instructions to implement the modeling agent further comprise instructions to parameterize a texture in each of the mesh grid elements.

S/N 09/887,412

Response to Office Action Dated 11/17/2004

11. (Previously presented) A storage medium according to claim 10, wherein the instructions to implement the modeling agent further comprise instructions to generate a shell texture model for each grid element of the mesh grid based, at least in part, on the parameterization of the grid elements.

12. (Original) A storage medium according to claim 10, wherein the instructions develop the surface detail model comprise instructions to generate a shell texture model for each element of a dynamically generated grid representation of uncovered surfaces of an object.

13. (Previously presented) A storage medium according to claim 12, wherein the instructions to generate a texture model comprise instructions to generate a mesh grid representation of uncovered surfaces of the object, simulate hair in each of the grid elements, and generate the hair into a volume texture covering the grid element on a per-grid element basis.

14. (Original) A storage medium according to claim 13, wherein the instructions to implement the modeling agent further comprise instructions to utilize the volume texture to generate semi-transparent concentric shells of the volume texture, and to layer the shells over select areas of the object surface.

15. (Currently amended) An apparatus comprising:

S/N 09/887,412

Response to Office Action Dated 11/17/2004

a modeling agent, to develop a surface detail model utilizing a modeling technique appropriate for a given set of viewing parameters; and

a rendering engine, responsive to the modeling agent, capable of rendering surface detail in real time with smooth transitions from close-up views to distant views in accordance with the developed surface detail model over an object surface, the render engine including a mesh grid representation made from at least one mesh grid element, the surface detail model associating at least one seed with the mesh grid element, the at least one seed being located in each mesh grid element, at least one surface detail extending from each seed in a direction that has a perpendicular component to a plane formed by the mesh grid element such that at least a portion of the surface detail extends outwardly from the boundaries of the mesh grid element.

16. (Previously presented) An apparatus according to claim 15, the modeling agent comprising:

a geometry preprocessor module, to generate a mesh grid representation of uncovered surfaces of the object, to simulate hair in each of the grid elements, and generate the simulated hair into a volume texture on a per-grid element basis, wherein each hair extends from a seed that is located within one grid element.

17. (Original) An apparatus according to claim 16, wherein the geometry preprocessor parameterizes a texture in each of the grid elements.

S/N 09/887,412

Response to Office Action Dated 11/17/2004

18. (Original) An apparatus according to claim 17, wherein the geometry preprocessor generates a shell texture model for each grid element of the mesh based, at least in part, on the parameterization of the grid element(s).

19. (Original) An apparatus according to claim 15, wherein the surface detail engine generates a shell texture model for each element of a dynamically generated mesh grid representation of uncovered surfaces of an object.

20. (Previously presented) An apparatus according to claim 19, the surface detail engine comprising:

a geometry preprocessor, to generate a mesh grid representation of the uncovered surfaces of the object, to simulate hair in each of the grid elements, and to generate the hair into a volume texture on a per-grid element basis.

21. (Previously presented) An apparatus according to claim 20, the surface detail engine comprising:

a shell generator module, to utilize the volume texture and generate at least one semi-transparent concentric shell.

22. (Original) An apparatus according to claim 21, further comprising:

a memory device including a plurality of executable instructions; and

a controller, coupled to the memory device, to execute at least a subset of the plurality of executable instructions to implement the surface modeling agent.

S/N 09/887,412

Response to Office Action Dated 11/17/2004

23. (Previously presented) The method of claim 1, wherein there is at least one seed contained within each mesh grid element of the mesh grid.

24. (Previously presented) The storage medium of claim 8, wherein there is at least one seed contained within each mesh grid element of the mesh grid.

25. (Previously presented) The apparatus of claim 15, wherein there is at least one seed contained within each mesh grid element of the mesh grid.

26. (Currently amended) A method comprising:
generating a mesh grid representation of uncovered surfaces of ~~[[the]]~~ an object formed from a plurality of substantially planar mesh grid elements;
applying a plurality of surface detail seeds to each planar mesh grid element, at least one surface detail seed being located in each planar mesh grid element; and

generating surface detail elements in real time to extend from each seed in a direction such that at least a portion of a simulated surface detail element extends outwardly from the boundaries of the planar mesh grid element; and

smoothly transitioning in real time from close-up views to distant views of the surface detail elements by utilizing different surface detail modeling techniques associated with different sets of viewing parameters.

S/N 09/887,412

Response to Office Action Dated 11/17/2004

27. (Previously presented) The method of claim 26, wherein each surface detail element includes a hair.

28. (Previously presented) The storage medium of claim 8, wherein each surface detail includes a hair.

29. (Previously presented) The method of claim 26, wherein at least a portion of the surface detail element extends beyond the boundaries of the mesh grid element.

30. (Previously presented) The method of claim 29, wherein at least one of the surface detail elements extends in a direction that is perpendicular to the planar mesh grid elements to form a life-like surface detail surface that is spaced from the mesh grid representation of the uncovered surfaces of the object.